IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Steven C. Taylor

Serial No.: 10/803,518

Filed: March 17, 2004

For: Ultrasonic Pulser-Receiver

Examiner: Jacques M. Saint-Surin

Group Art Unit: 2856

Attorney Docket No.: B-369

Mail Stop Appeal Brief-Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

APPEAL BRIEF

Sir:

Appellant is appealing from the rejection of claims 1-44 application in a Final Office Action dated December 22, 2006. Please charge the required fee in the amount of $500.00 specified under 37 C.F.R. §41.20(b)(2) for filing this Appeal Brief to PTO Deposit Account No. 05-0565.

In accordance with 37 C.F.R. §41.37, this Appeal Brief is being filed within the 30 day response period set by the Notice of Panel Decision from Pre-Appeal Brief Review dated April 5, 2006. Therefore, no extension fees are due.

Real Party In Interest

The real party in interest is Battelle Energy Alliance, LLC.

Related Appeals and Interferences

There are no other appeals which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

Status of Claims

Claims 1-44 are pending. The claims appealed are claims 1-44.

Status of Amendments

No amendments were filed subsequent to the Final Office Action of December 22, 2005.

Summary of Claimed Subject Matter

Some aspects of the invention, defined by claim 1, provide ultrasonic pulser-receiver circuitry 12, 14, for use with an ultrasonic transducer 18 (p.5, ln.6-8, Fig.1A,1B,2A,2B). The circuitry 12, 14 comprises a circuit board 16 (p.5, ln.17-18, Fig.2B). The circuitry comprises ultrasonic pulser circuitry 14 supported by the circuit board 16 and configured to be coupled to an ultrasonic transducer 18 and to cause the ultrasonic transducer to emit an ultrasonic output pulse (p.5, ln.6-8, ln.13-15, ln.17-18, Fig.1A,1B,2A,2B). The circuitry comprises receiver circuitry 12 supported by the circuit board 16, coupled to the pulser circuitry 14 (p.5, ln.6-8, p.5, ln.17-p.6, ln.2, Fig.1A,1B,2A,2B). The receiver circuitry 12 includes protection circuitry 36 configured to protect against the ultrasonic pulse (p.6, ln.22-p.7, ln.4, Fig. 1A). The receiver circuitry 12 further includes

amplifier circuitry 34 configured to amplify an echo, received back by the transducer 18, of the output pulse (p.6, ln.4-16, Fig. 1B). The circuitry 12, 14 further comprises a connector 24, proximate an end of the circuit board 16, configured to couple the ultrasonic transducer 18 directly to the circuit board 16, to the pulser circuitry 14 and receiver circuitry 12, wherein impedance mismatches that would result if the transducer 18 was coupled to the circuit board 16 via a cable can be avoided (p.6, ln.7-10, p.5, ln.2-5, Fig.2B).

Some aspects of the invention, defined by claim 16, provide ultrasonic pulser-receiver circuitry 12, 14, for use with an ultrasonic transducer 18 (p.5, ln.6-8, Fig.1A,1B,2A,2B). The circuitry 12, 14 comprises a circuit board 16 (p.5, ln.17-18, Fig.2B). The circuitry 12, 14 comprises ultrasonic pulser circuitry 14 supported by the circuit board 16 and configured to be coupled to an ultrasonic transducer 18 and to cause the ultrasonic transducer to emit an ultrasonic output pulse (p.5, ln.6-8, ln.13-15, ln.17-18, Fig.1A,1B,2A,2B). The pulser circuitry 14 includes an input 30 configured to receive an input pulse from an external source (p.9, ln.5-6, Fig. 2A). The pulser circuitry 14 includes an input trigger amplifier U6 coupled to the input 30 (p.8, ln.13-14, p.9, ln.5-6, Fig.2A). The circuitry 14 further includes a trigger driver U1 coupled to the trigger amplifier U6 (p.8, ln.14-15, p.9, ln.5-6, Fig.2A). The pulser circuitry 14 further includes a transistor Q1, Q2 coupled to the trigger amplifier U6, and circuitry, including a discharge capacitor C7 and charging and discharging diodes D5 through D8, coupled to the transistor Q1, Q2 (p.8, ln.13-15, Fig.2A,2B). The circuitry 12,14 comprises receiver circuitry 12 supported by the circuit board 16, coupled to the pulser circuitry 14 (p.5, ln.6-8, p.5, ln.17-p.6, ln.2), Fig.1A,1B,2A,2B). The receiver circuitry 12 includes protection circuitry 36 configured to protect against the ultrasonic pulse (p.6, ln.22-p.7, ln.4, Fig. 1A). The receiver circuitry 12 further includes amplifier circuitry 34 configured to amplify an echo, received back by the transducer 18, of the output pulse (p.6, ln.4-16, Fig. 1B). The circuitry

12, 14 further comprises a connector 24 configured to couple the ultrasonic transducer 18 directly to the circuit board 16, to the pulser circuitry 14 and receiver circuitry 12, wherein impedance mismatches that would result if the transducer 18 was coupled to the circuit board 16 via a cable can be avoided (p.6, ln.7-10, p.5,ln.2-5, Fig.2B).

Some aspects of the invention, defined by claim 31, provide an ultrasonic pulser-receiver 10 comprising an ultrasonic transducer 18 (p.5, ln.6-8, Fig.1A,1B,2A,2B). The ultrasonic pulser-receiver 10 comprises a circuit board 16 (p.5, ln.17-18, Fig.2B). The ultrasonic pulser-receiver 10 comprises ultrasonic pulser circuitry 14 supported by the circuit board 16 and coupled to the ultrasonic transducer 18 to selectively cause the ultrasonic transducer to emit an ultrasonic output pulse (p.5, ln.6-8, ln.13-15, ln.17-18, Fig.1A,1B,2A,2B). The pulser circuitry 14 includes an input 30 configured to receive an input pulse from an external computer (p.9, ln.5-6, Fig. 2A). The pulser circuitry 14 includes input trigger amplifier circuitry U6 coupled to the input 30 (p.8, ln.13-14, p.9, ln.5-6, Fig.2A). The pulser circuitry 14 further includes a trigger driver U1 coupled to the input trigger amplifier circuitry U6 (p.8, ln.14-15, p.9, ln.5-6, Fig.2A). The pulser circuitry 14 further includes a high power transistor Q1, Q2 coupled to the trigger amplifier U6, and a discharge capacitor C7 and charging and discharging diodes D5 through D8 coupled to the transistor Q1, Q2 (p.8, ln.13-15, Fig.2A,2B). The ultrasonic pulser-receiver 10 comprises receiver circuitry 12 supported by the circuit board 16, coupled to the pulser circuitry 14 (p.5, ln.6-8, p.5, ln.17-p.6, ln.2, Fig.1A,1B,2A,2B). The receiver circuitry 12 includes protection circuitry 36 configured to protect against the ultrasonic pulse (p.6, ln.22-p.7, ln.4, Fig. 1A). The receiver circuitry 12 includes amplifier circuitry 34 configured to amplify an echo, received back by the transducer 18, of the output pulse (p.6, ln.4-16, Fig. 1B). The ultrasonic pulser-receiver, in operation, has a rise time of less than 1 nanosecond (p.10, ln.3-4).

Some aspects of the invention, defined by claim 44, provide an ultrasonic pulser-receiver 10 comprising an ultrasonic transducer 18 (p.5, ln.6-8, Fig.1A,1B,2A,2B). The ultrasonic pulser-receiver 10 comprises a circuit board (p.5, ln.17-18, Fig.2B). The ultrasonic pulser-receiver 10 comprises ultrasonic pulser circuitry 14 supported by the circuit board 16 and coupled to the ultrasonic transducer 18 to selectively cause the ultrasonic transducer 18 to emit an ultrasonic output pulse (p.5, ln.6-8, ln.13-15, ln.17-18, Fig.1A,1B,2A,2B). The pulser circuitry 14 includes an input 30 configured to receive an input pulse from an external computer (p.9, ln.5-6, Fig. 2A). The pulser circuitry 14 includes input trigger amplifier circuitry U6 coupled to the input 30 (p.8, ln.13-14, p.9, ln.5-6, Fig.2A). The pulser circuitry 14 further includes a trigger driver U1 coupled to the input trigger amplifier circuitry U6 (p.8, ln.14-15, p.9, ln.5-6, Fig.2A). The pulser circuitry 14 further includes a high power transistor Q1, Q2 coupled to the trigger amplifier U6, and a discharge capacitor C7 and charging and discharging diodes D5 through D8 coupled to the transistor Q1, Q2 (p.8, ln.13-15, Fig.2A,2B). The pulser-receiver 10 further includes receiver circuitry 12 supported by the circuit board 16, coupled to the pulser circuitry 14 (p.5, ln.6-8, p.5, ln.17-p.6, ln.2), Fig.1A,1B,2A,2B). The receiver circuitry 12 includes protection circuitry 36 configured to protect against the ultrasonic pulse (p.6, ln.22-p.7, ln.4, Fig. 1A). The receiver circuitry 12 includes amplifier circuitry 34 configured to amplify an echo, received back by the transducer 18, of the output pulse (p.6, ln.4-16, Fig. 1B). The pulser-receiver 10 further includes a connector 24, proximate an end of the circuit board 16, configured to couple the ultrasonic transducer directly to the circuit board 16 to the pulser circuitry and to the receiver circuitry (p.6, ln.7-10, p.5, ln.2-5, Fig.2B). The pulser-receiver 10 further includes a housing 17 surrounding the circuit board 16 and protecting the circuit board 16 against water, after the transducer 18 has been coupled to the connector 24 (p.6, ln.4-7, Fig.2A). The ultrasonic pulser-receiver 10 has, in operation, a rise time of

less than 1 nanosecond (p.10, ln.3-4). The ultrasonic pulser-receiver 10 has, in operation, a front surface ring down of less than 60 nanoseconds (p.10, ln.4-6). The ultrasonic pulser-receiver 10 has, in operation, a transducer delay-line of less than 20 microseconds (p.10, ln.6-8). The ultrasonic pulser-receiver has, in operation, a depth of field, in inches, of less than 0.136 inch (p.10, ln.12-14).

Grounds of Rejection to be Reviewed on Appeal

Whether or not claims 1, 6-8, 10, 13-16 21, 23, 25 and 28-30 are patentable under 35 U.S.C. §103(a) over U.S. Patent No. 5,303,591 to Dykes et al. in view of U.S. Patent No. 6,570,097 to Monde et al.

Whether or not claims 2, 4-5, 9, 17, 19-20 and 24 are patentable under 35 U.S.C. §103(a) over U.S. Patent No. 5,303,591 to Dykes et al. in view of U.S. Patent No. 6,570,097 to Monde et al., and further in view of U.S. Patent No. 5,473,934 to Cobb.

Whether or not claims 3 and 18 are patentable under 35 U.S.C. §103(a) over U.S. Patent No. 5,303,591 to Dykes et al. in view of U.S. Patent No. 6,570,097 to Monde et al., and further in view of U.S. Patent No.3,201,612 to Amodei.

Whether or not claims 7 and 22 are patentable under 35 U.S.C. §103(a) over U.S. Patent No. 5,303,591 to Dykes et al. in view of U.S. Patent No. 6,570,097 to Monde et al., and further in view of U.S. Patent No.5,526,213 to MacLauchlan et al.

Whether or not claims 11-12, 26-27 and 44 are patentable under 35 U.S.C. §103(a) over U.S. Patent No. 5,303,591 to Dykes et al. in view of U.S. Patent No. 6,570,097 to Monde et al., and further in view of U.S. Patent No.5,108,693 to Landry et al.

Whether or not claims 31, 34, 36, 38 and 41-43 are patentable under 35 U.S.C. §103(a) over U.S. Patent No. 5,303,591 to Dykes et al. in view of U.S. Patent No. 3,201,612 to Amodei.

Whether or not claims 32-33 and 37 are patentable under 35 U.S.C. §103(a) over U.S. Patent

No. 5,303,591 to Dykes et al. in view of U.S. Patent No. 3,201,612 to Amodei, and further in view of U.S. Patent No.5,473,934 to Cobb.

Whether or not claim 35 is patentable under 35 U.S.C. §103(a) over U.S. Patent No. 5,303,591 to Dykes et al. in view of U.S. Patent No. 3,201,612 to Amodei, and further in view of U.S. Patent No. 5,526,213 to MacLauchlan et al.

Whether or not claims 39-40 are patentable under 35 U.S.C. §103(a) over U.S. Patent No. 5,303,591 to Dykes et al. in view of U.S. Patent No. 3,201,612 to Amodei, and further in view of U.S. Patent No. 5,108,693 to Landry et al.

Argument

Claim 1

Claims 1, 6-8, 10, 13-16 21, 23, 25 and 28-30 stand rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,303,591 to Dykes et al. in view of U.S. Patent No. 6,570,097 to Monde et al.

Claim 1 recites ultrasonic pulser-receiver circuitry, for use with an ultrasonic transducer, the circuitry comprising a circuit board; ultrasonic pulser circuitry supported by the circuit board and configured to be coupled to an ultrasonic transducer and to cause the ultrasonic transducer to emit an ultrasonic output pulse; receiver circuitry supported by the circuit board, coupled to the pulser circuitry, including protection circuitry configured to protect against the ultrasonic pulse and including amplifier circuitry configured to amplify an echo, received back by the transducer, of the output pulse; and a connector, proximate an end of the circuit board, configured to couple the ultrasonic transducer directly to the circuit board, to the pulser circuitry and receiver circuitry,

wherein impedance mismatches that would result if the transducer was coupled to the circuit board via a cable can be avoided.

The Dykes et al. reference fails to disclose a connector configured to couple the ultrasonic transducer directly to the circuit board, to the pulser circuitry and receiver circuitry, wherein impedance mismatches that would result if the transducer was coupled to the circuit board via a cable can be avoided.

It would not be obvious to combine the Monde et al. reference with the Dykes et al. reference because there is no teaching in the references which would suggest their combination. It would not be obvious to substitute the structure of Monde et al. for portions of the structure of Dykes et al. because there is no teaching in the references themselves of how the components should be combined. The mere fact that the structures of the references could possibly be somehow modified to result in the claimed structure does not render the claimed structure obvious unless the references themselves suggest the desirability of the modification. Monde et al. are not at all concerned with ultrasonic pulser-receiver circuitry. Indeed, Monde et al. state that "The connector of the present invention may be either of the type where it is mounted directly to a substrate or of the type where it is connected to a cable." If one of ordinary skill in the art were to combine Monde et al. with Dykes et al., they could still use a cable, and thus not solve the problem solved by Appellant.

Nothing in Monde et al. suggests using the Monde et al. connector to couple an ultrasonic transducer to a circuit board. Monde et al. instead disclose that "The connector can be used for various applications such as interconnection between a plurality of circuit boards, interconnection between a plurality of devices, interconnection between connectors and circuit boards, interconnection between connectors, and integrated circuit sockets such as CPU sockets." There is

no disclosure of using the Monde et al. connector to connect an ultrasonic transducer to a circuit board or even a generic component to a circuit board.

Further, insufficient evidence has been presented to support motivation to combine the teachings of U.S. Patent No. 5,303,591 to Dykes et al. with U.S. Patent No. 6,570,097 to Monde et al. in the rejection, and the obviousness rejections of these claims are improper for at least this reason.

The Federal Circuit discussed proper motivation in the case of *In re Lee*, 61 USPQ 2d 1430 (Fed. Cir. 2002). The motivation identified in the Office Action that "The Examiner believes that one of ordinary skill in the art would be motivated to recognized how to modify the teaching of Dykes for utilizing the connector of Monde in while impedance matching can be easily established", is akin to the conclusory statements set forth in *In re Lee* which were found to fail to provide the requisite motivation to support an obviousness rejection. The Court in *In re Lee* stated the factual inquiry whether to combine references must be thorough and searching. It must be based on objective evidence of record. The Court in *In re Fritch*, 23 USPQ 2d 1780, 1783 (Fed. Cir. 1992) stated motivation is provided only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art that would lead that individual to combine the relevant teachings of the references. The *Lee* Court stated that the Examiner's conclusory statements in the *Lee* case do not adequately address the issue of motivation to combine. The Court additionally stated that the factual question of motivation is material to patentability and cannot be resolved on subjective belief and unknown authority. The Court also stated that deficiencies of cited references cannot be remedied by general conclusions about what is basic knowledge or common sense. The Court further stated that the determination of patentability must be based on evidence

In the instant case, the record is entirely devoid of any evidence to support motivation to combine the teachings apart from the bald conclusory statements of the Examiner which are insufficient for proper motivation as set forth by the Federal Circuit. The only rationale is the subjective opinion of the Examiner improperly based upon Appellant's own disclosure. There is no motivation to combine the reference teachings, and the Office has failed to establish a *prima facie* rejection for at least this reason.

Further, even if the references could be combined, the combination would fail to provide all the elements of claim 1. Claim 1 recites that the connector is proximate an end of the circuit board. Even if Monde et al. could be combined with Dykes et al, nothing in Monde et al. suggests where on a circuit board a connector should be located.

Therefore, claim 1 is allowable.

As claims 2-15 depend on claim 1, they too are allowable.

Claim 16

Claim 16 recites ultrasonic pulser-receiver circuitry, for use with an ultrasonic transducer, the circuitry comprising a circuit board; ultrasonic pulser circuitry supported by the circuit board and configured to be coupled to an ultrasonic transducer and to cause the ultrasonic transducer to emit an ultrasonic output pulse, the pulser circuitry including an input configured to receive an input pulse from an external source, an input trigger amplifier coupled to the input, a trigger driver coupled to the trigger amplifier, a transistor coupled to the trigger amplifier, and circuitry, including a discharge capacitor and charging and discharging diodes, coupled to the transistor; receiver circuitry supported by the circuit board, coupled to the pulser circuitry, including protection circuitry configured to protect against the ultrasonic pulse and including amplifier circuitry configured to amplify an echo,

received back by the transducer, of the output pulse; and a connector configured to couple the ultrasonic transducer directly to the circuit board, to the pulser circuitry and receiver circuitry, wherein impedance mismatches that would result if the transducer was coupled to the circuit board via a cable can be avoided.

The Dykes et al. reference fails to disclose a connector configured to couple the ultrasonic transducer directly to the circuit board, to the pulser circuitry and receiver circuitry.

Nothing in Monde et al. suggests using the Monde et al. connector to couple an ultrasonic transducer to a circuit board.

Insufficient evidence has been presented to support motivation to combine the teachings of U.S. Patent No. 5,303,591 to Dykes et al. with U.S. Patent No. 6,570,097 to Monde et al. The record is entirely devoid of any evidence to support motivation to combine the teachings apart from the bald conclusory statements of the Examiner which are insufficient for proper motivation as set forth by the Federal Circuit. The only rationale is the subjective opinion of the Examiner improperly based upon Appellant's own disclosure. There is no motivation to combine the reference teachings, and the Office has failed to establish a *prima facie* rejection for at least this reason.

Further, even if the references could be combined, the combination would fail to disclose a common connector coupling an ultrasonic transducer to both pulser circuitry and receiver circuitry.

Therefore, claim 16 is allowable.

As claims 17-30 depend on claim 16, they too are allowable.

Claim 31

Claims 31, 34, 36, 38 and 41-43 stand rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,303,591 to Dykes et al. in view of U.S. Patent No. 3,201,612 to Amodei.

Claim 31 recites an ultrasonic pulser-receiver comprising an ultrasonic transducer; a circuit board; ultrasonic pulser circuitry supported by the circuit board and coupled to the ultrasonic transducer to selectively cause the ultrasonic transducer to emit an ultrasonic output pulse, the pulser circuitry including an input configured to receive an input pulse from an external computer, input trigger amplifier circuitry coupled to the input, a trigger driver coupled to the input trigger amplifier circuitry, a high power transistor coupled to the trigger amplifier, and a discharge capacitor and charging and discharging diodes coupled to the transistor; and receiver circuitry supported by the circuit board, coupled to the pulser circuitry, including protection circuitry configured to protect against the ultrasonic pulse and including amplifier circuitry configured to amplify an echo, received back by the transducer, of the output pulse, the ultrasonic pulser-receiver, in operation having a rise time of less than 1 nanosecond.

Insufficient evidence has been presented to support motivation to combine the teachings of U.S. Patent No. 5,303,591 to Dykes et al. with U.S. Patent No. 3,201,612 to Amodei in the rejection of claims 31-43 and the obviousness rejections of these claims are improper for at least this reason.

If one of ordinary skill in the art were given Amodei and Dykes et al., they would not even realize that it is desirable to produce a rise time of less than 1 nanosecond absent Appellant's disclosure. Amodei discloses a pulse generator and is not concerned with the field of ultrasonics or non-destructive testing.

Given only Amodei and Dykes et al., if it were possible to combine them, one of ordinary skill in the art would perhaps want to couple a tuning transmission line across a storage diode, as taught by Amodei et al. However, it would not be clear which of the diodes in Dykes et al. should have a tuning transmission line coupled across it or whether a new diode should be added. If a new diode should be added, it is not clear where it should be placed.

Even if the references were combined, the combination would fail to include an input configured to receive an input pulse from an external computer, as required by claim 31. The term "computer" does not appear anywhere in Dykes et al.

Therefore, claim 31 is allowable.

As claims 32-43 depend on claim 31, they too are allowable.

Claim 44

Claim 44 recites an ultrasonic pulser-receiver comprising an ultrasonic transducer; a circuit board; ultrasonic pulser circuitry supported by the circuit board and coupled to the ultrasonic transducer to selectively cause the ultrasonic transducer to emit an ultrasonic output pulse, the pulser circuitry including an input configured to receive an input pulse from an external computer, input trigger amplifier circuitry coupled to the input, a trigger driver coupled to the input trigger amplifier circuitry, a high power transistor coupled to the trigger amplifier, and a discharge capacitor and charging and discharging diodes coupled to the transistor; receiver circuitry supported by the circuit board, coupled to the pulser circuitry, including protection circuitry configured to protect against the ultrasonic pulse and including amplifier circuitry configured to amplify an echo, received back by the transducer, of the output pulse; a connector, proximate an end of the circuit board, configured to couple the ultrasonic transducer directly to the circuit board, to the pulser circuitry and to the receiver

circuitry; and a housing surrounding the circuit board and protecting the circuit board against water, after the transducer has been coupled to the connector; the ultrasonic pulser-receiver having, in operation, a rise time of less than 1 nanosecond; the ultrasonic pulser-receiver having, in operation, a front surface ring down of less than 60 nanoseconds; the ultrasonic pulser-receiver having, in operation, a transducer delay-line of less than 20 microseconds; and the ultrasonic pulser-receiver having, in operation, a depth of field, in inches, of less than 0.136 inch.

Insufficient evidence has been presented to support motivation to combine the teachings of Dykes et al. with Monde et al. Insufficient evidence has been presented to support motivation to combine a combination of Dykes et al. and Monde et al. with Landry et al.

Even if Dykes et al. could be combined with Monde et al. and if that combination could be further combined with Landry et al., a combination of three references, the combination of references would still fail to disclose a front surface ring down of less than 60 nanoseconds.

The Examiner has stated that discovering the optimum or workable ranges involves only routine skill in the art, and has cited *In re Aller*. The Examiner must show something in the references themselves that teaches or suggests Appellant's claimed combination of parameters. The following remarks by the Court of Customs and Patent Appeals are pertinent:

> The Solicitor, relying upon In re Aller, 42 C.C.P.A. 824, 220 F.2d 454, 105 U.S.P.O. [sic] 233 (CCPA 1955), argues that it is "not unobvious to discover optimum or workable ranges by routine experimentation." In many instances, this may be true. The problem, however, with such "rules of patentability" (and the ever-lengthening list of exceptions which they engender) is that they tend to becloud the ultimate legal issue - obviousness - and exalt the formal exercise of squeezing new factual situations

into preestablished pigeonholes. Additionally, the emphasis upon routine experimentation is contrary to the last sentence of section 103.

In re Yates, 663 F.2d 1054 (CCPA 1981).

Therefore, claim 44 is allowable.

In view of the foregoing, reversal of the rejection of claim 1-44 is requested.

Respectfully submitted,

Dated: April 20, 2006

By: /Alan D. Kirsch/
Alan D. Kirsch
Attorney for Appellant
Reg. No. 33,720
P.O. Box 1625
Idaho Falls, Idaho 83415-3899
(208) 526-1371

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Steven C. Taylor

Serial No.: 10/803,518

Filed: March 17, 2004

For: Ultrasonic Pulser-Receiver

Examiner: Jacques M. Saint-Surin

Group Art Unit: 2856

Attorney Docket No.: B-369

APPENDIX

The claims involved in the appeal are as follows:

1. Ultrasonic pulser-receiver circuitry, for use with an ultrasonic transducer, the circuitry comprising:

a circuit board;

ultrasonic pulser circuitry supported by the circuit board and configured to be coupled to an ultrasonic transducer and to cause the ultrasonic transducer to emit an ultrasonic output pulse;

receiver circuitry supported by the circuit board, coupled to the pulser circuitry, including protection circuitry configured to protect against the ultrasonic pulse and including amplifier circuitry configured to amplify an echo, received back by the transducer, of the output pulse; and

a connector, proximate an end of the circuit board, configured to couple the ultrasonic transducer directly to the circuit board, to the pulser circuitry and receiver circuitry, wherein

impedance mismatches that would result if the transducer was coupled to the circuit board via a cable can be avoided.

2. Ultrasonic pulser-receiver circuitry in accordance with claim 1 and, when in operation, having a rise time of less than 5 nanoseconds.

3. Ultrasonic pulser-receiver circuitry in accordance with claim 1 and, when in operation, having a rise time of less than 1 nanosecond.

4. Ultrasonic pulser-receiver circuitry in accordance with claim 1 and, when in operation with an ultrasonic transducer, having a front surface ring down of less than 60 nanoseconds.

5. Ultrasonic pulser-receiver circuitry in accordance with claim 1 and, when in operation with an ultrasonic transducer, having a front surface ring down of less than 40 nanoseconds.

6. Ultrasonic pulser-receiver circuitry in accordance with claim 1 and, when in operation with an ultrasonic transducer, having a transducer delay-line of less than 20 microseconds.

7. Ultrasonic pulser-receiver circuitry in accordance with claim 1 wherein no transducer delay-line is required.

8. Ultrasonic pulser-receiver circuitry in accordance with claim 1 and, when in operation with an ultrasonic transducer, having a focal length of about 19 microseconds.

9. Ultrasonic pulser-receiver circuitry in accordance with claim 1 and, when in operation with an ultrasonic transducer, having a depth of field, in time, of less than +/- 32 nanoseconds.

10. Ultrasonic pulser-receiver circuitry in accordance with claim 1 and, when in operation with an ultrasonic transducer, having a depth of field, in time, of less than +/- 2 microseconds.

11. Ultrasonic pulser-receiver circuitry in accordance with claim 1 and, when in operation with an ultrasonic transducer, having a depth of field, in inches, of less than 0.005 inch.

12. Ultrasonic pulser-receiver circuitry in accordance with claim 1 and, when in operation with an ultrasonic transducer, having a depth of field, in inches, of less than 0.136 inch.

13. Ultrasonic pulser-receiver circuitry in accordance with claim 1 wherein the circuit board has one side supporting at least a majority of the receiver circuitry and an opposite side supporting at least a majority of the pulser circuitry.

14. Ultrasonic pulser-receiver circuitry in accordance with claim 13 wherein at least a majority of the receiver circuitry is defined by components that are surface mounted onto the circuit board.

15. Ultrasonic pulser-receiver circuitry in accordance with claim 13 wherein at least a majority of the pulser circuitry is defined by components that are surface mounted onto the circuit board.

16. Ultrasonic pulser-receiver circuitry, for use with an ultrasonic transducer, the circuitry comprising:

a circuit board;

ultrasonic pulser circuitry supported by the circuit board and configured to be coupled to an ultrasonic transducer and to cause the ultrasonic transducer to emit an ultrasonic output pulse, the pulser circuitry including an input configured to receive an input pulse from an external source, an input trigger amplifier coupled to the input, a trigger driver coupled to the trigger amplifier, a transistor coupled to the trigger amplifier, and circuitry, including a discharge capacitor and charging and discharging diodes, coupled to the transistor;

receiver circuitry supported by the circuit board, coupled to the pulser circuitry, including protection circuitry configured to protect against the ultrasonic pulse and including amplifier circuitry configured to amplify an echo, received back by the transducer, of the output pulse; and

a connector configured to couple the ultrasonic transducer directly to the circuit board, to the pulser circuitry and receiver circuitry, wherein impedance mismatches that would result if the transducer was coupled to the circuit board via a cable can be avoided.

17. Ultrasonic pulser-receiver circuitry in accordance with claim 16 and, when in operation, having a rise time of less than 5 nanoseconds.

18. Ultrasonic pulser-receiver circuitry in accordance with claim 16 and, when in operation, having a rise time of less than 1 nanosecond.

19. Ultrasonic pulser-receiver circuitry in accordance with claim 16 and, when in operation with an ultrasonic transducer, having a front surface ring down of less than 60 nanoseconds.

20. Ultrasonic pulser-receiver circuitry in accordance with claim 16 and, when in operation with an ultrasonic transducer, having a front surface ring down of less than 40 nanoseconds.

21. Ultrasonic pulser-receiver circuitry in accordance with claim 16 and, when in operation with an ultrasonic transducer, having a transducer delay-line of less than 20 microseconds.

22. Ultrasonic pulser-receiver circuitry in accordance with claim 16 wherein no transducer delay-line is required.

23. Ultrasonic pulser-receiver circuitry in accordance with claim 16 and, when in operation with an ultrasonic transducer, having a focal length of about 19 microseconds.

24. Ultrasonic pulser-receiver circuitry in accordance with claim 16 and, when in operation with an ultrasonic transducer, having a depth of field, in time, of less than +/- 32 nanoseconds.

25. Ultrasonic pulser-receiver circuitry in accordance with claim 16 and, when in operation with an ultrasonic transducer, having a depth of field, in time, of less than +/- 2 microseconds.

26. Ultrasonic pulser-receiver circuitry in accordance with claim 16 and, when in operation with an ultrasonic transducer, having a depth of field, in inches, of less than 0.005 inch.

27. Ultrasonic pulser-receiver circuitry in accordance with claim 16 and, when in operation with an ultrasonic transducer, having a depth of field, in inches, of less than 0.136 inch.

28. Ultrasonic pulser-receiver circuitry in accordance with claim 16 wherein the circuit board has one side supporting at least a majority of the receiver circuitry and an opposite side supporting at least a majority of the pulser circuitry.

29. Ultrasonic pulser-receiver circuitry in accordance with claim 28 wherein at least a majority of the receiver circuitry is defined by components that are surface mounted onto the circuit board.

30. Ultrasonic pulser-receiver circuitry in accordance with claim 28 wherein at least a majority of the pulser circuitry is defined by components that are surface mounted onto the circuit board.

31. An ultrasonic pulser-receiver comprising:

an ultrasonic transducer;

a circuit board;

ultrasonic pulser circuitry supported by the circuit board and coupled to the ultrasonic transducer to selectively cause the ultrasonic transducer to emit an ultrasonic output pulse, the pulser circuitry including an input configured to receive an input pulse from an external computer, input trigger amplifier circuitry coupled to the input, a trigger driver coupled to the input trigger amplifier circuitry, a high power transistor coupled to the trigger amplifier, and a discharge capacitor and charging and discharging diodes coupled to the transistor; and

receiver circuitry supported by the circuit board, coupled to the pulser circuitry, including protection circuitry configured to protect against the ultrasonic pulse and including amplifier circuitry configured to amplify an echo, received back by the transducer, of the output pulse, the ultrasonic pulser-receiver, in operation having a rise time of less than 1 nanosecond.

32. An ultrasonic pulser-receiver in accordance with claim 31 and having, in operation, a front surface ring down of less than 60 nanoseconds.

33. An ultrasonic pulser-receiver in accordance with claim 31 and having, in operation, a front surface ring down of less than 40 nanoseconds.

34. An ultrasonic pulser-receiver in accordance with claim 32 and having, in operation, a transducer delay-line of less than 20 microseconds.

35. An ultrasonic pulser-receiver in accordance with claim 33 wherein no transducer delay-line is required.

36. An ultrasonic pulser-receiver in accordance with claim 34 and, in operation, having a focal length of about 19 microseconds.

37. An ultrasonic pulser-receiver in accordance with claim 35 and, in operation, having a depth of field, in time, of less than +/- 32 nanoseconds.

38. An ultrasonic pulser-receiver in accordance with claim 36 and, in operation, having a depth of field, in time, of less than +/- 2 microseconds.

39. An ultrasonic pulser-receiver in accordance with claim 37 and, in operation, having a depth of field, in inches, of less than 0.005 inch.

40. An ultrasonic pulser-receiver in accordance with claim 38 and, in operation, having a depth of field, in inches, of less than 0.136 inch.

41. An ultrasonic pulser-receiver in accordance with claim 40 wherein the circuit board has one side supporting at least a majority of the receiver circuitry and an opposite side supporting at least a majority of the pulser circuitry.

42. An ultrasonic pulser-receiver in accordance with claim 41 wherein at least a majority of the receiver circuitry is defined by components that are surface mounted onto the circuit board.

43. An ultrasonic pulser-receiver in accordance with claim 42 wherein at least a majority of the pulser circuitry is defined by components that are surface mounted onto the circuit board.

44. An ultrasonic pulser-receiver comprising:

an ultrasonic transducer;

a circuit board;

ultrasonic pulser circuitry supported by the circuit board and coupled to the ultrasonic transducer to selectively cause the ultrasonic transducer to emit an ultrasonic output pulse, the pulser circuitry including an input configured to receive an input pulse from an external computer, input trigger amplifier circuitry coupled to the input, a trigger driver coupled to the input trigger amplifier circuitry, a high power transistor coupled to the trigger amplifier, and a discharge capacitor and charging and discharging diodes coupled to the transistor;

receiver circuitry supported by the circuit board, coupled to the pulser circuitry, including protection circuitry configured to protect against the ultrasonic pulse and including amplifier circuitry configured to amplify an echo, received back by the transducer, of the output pulse;

a connector, proximate an end of the circuit board, configured to couple the ultrasonic transducer directly to the circuit board, to the pulser circuitry and to the receiver circuitry; and

a housing surrounding the circuit board and protecting the circuit board against water, after the transducer has been coupled to the connector;

the ultrasonic pulser-receiver having, in operation, a rise time of less than 1 nanosecond;

the ultrasonic pulser-receiver having, in operation, a front surface ring down of less than 60 nanoseconds;

the ultrasonic pulser-receiver having, in operation, a transducer delay-line of less than 20 microseconds; and

the ultrasonic pulser-receiver having, in operation, a depth of field, in inches, of less than 0.136 inch.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Steven C. Taylor

Serial No.: 10/803,518

Filed: March 17, 2004

For: Ultrasonic Pulser-Receiver

Examiner: Jacques M. Saint-Surin

Group Art Unit: 2856

Attorney Docket No.: B-369

EVIDENCE APPENDIX

There is no evidence submitted pursuant to §§1.130, 1.131, or 1.132 of this title or any other evidence entered by the Examiner and relied upon by Appellant In this Appeal.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Steven C. Taylor

Serial No.: 10/803,518

Filed: March 17, 2004

For: Ultrasonic Pulser-Receiver

Examiner: Jacques M. Saint-Surin

Group Art Unit: 2856

Attorney Docket No.: B-369

RELATED PROCEEDINGS APPENDIX

There are no known decisions rendered by a court or the Board in any proceeding identified pursuant to paragraph (c)(1)(ii) of 37 CFR §41.37.